

# Chapter 2

## The Energy Basics

Before going any further, you may find it helpful to review some essential energy concepts. Knowing these will help you better understand energy.

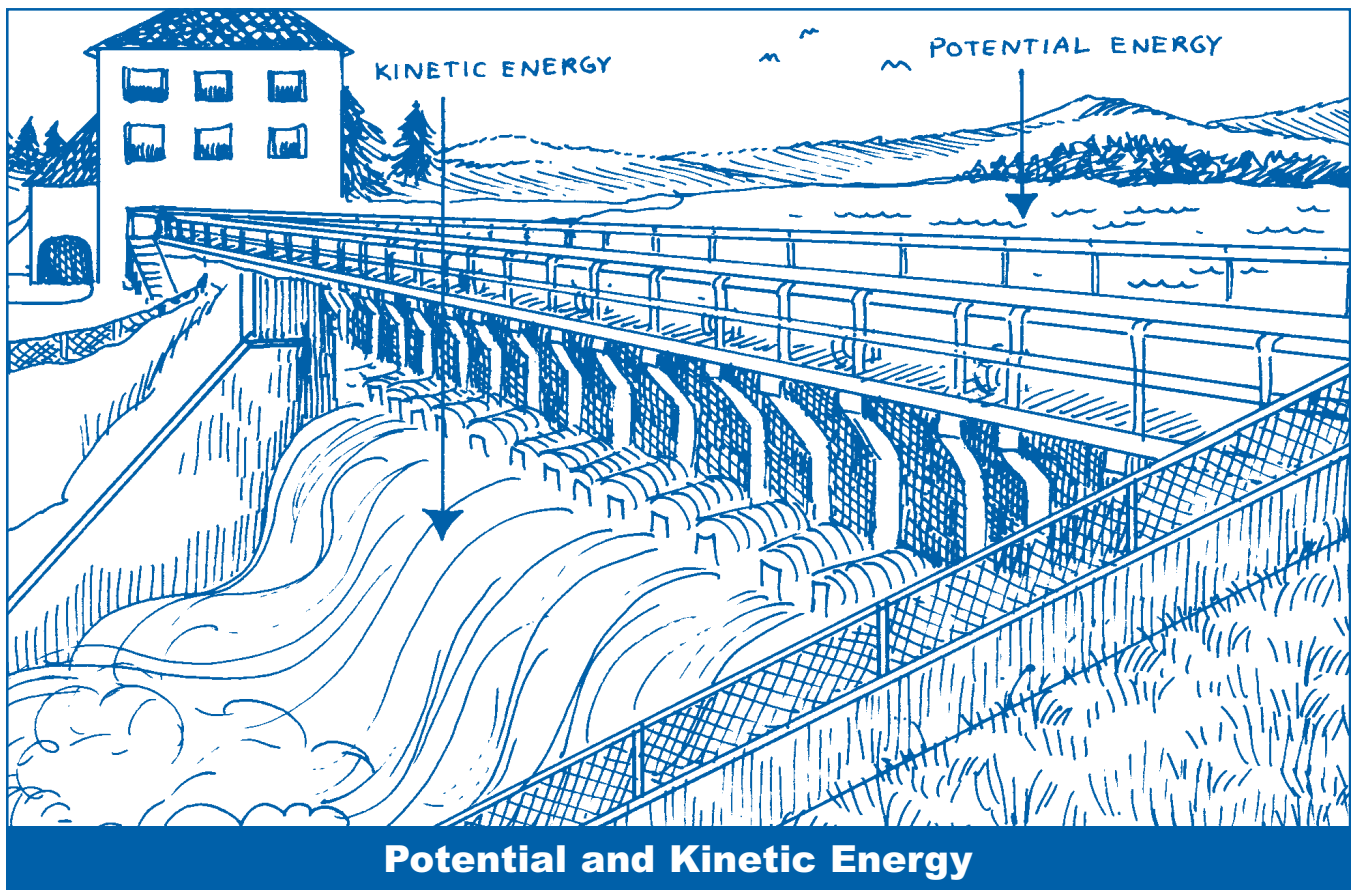
### Types of Energy

There are two types of energy: (1) *potential* or stored energy and (2) *kinetic* energy or energy in motion. As you can tell from the diagram, potential energy, such as that found in lake water, is energy which is not yet in use, but which may be trapped. Kinetic energy is energy in motion, such as a waterfall. Electricity produced by running water is also kinetic energy.

Energy can change from one type to another, as the water does in the diagram. When energy changes states (such as from potential to kinetic), energy is neither lost nor created. This is what is known as the *Law of the Conservation of Energy*. According to this principle, energy cannot be made or destroyed. It can only be changed from one type to another.

### Forms of Energy

In addition to changing states, energy can change into different forms. Once again, no energy is created and no energy is lost in the process. For example, when sunlight passes



through the rolled up windows of a car, it becomes trapped inside as heat energy. Similarly, the heat from burning coal can be used to change water into steam. One form of energy turns into another form. The steam can then be used to generate yet another form of energy, electricity.

There are several basic forms of energy. Light, either from the sun or a lamp, is known as *radiant energy*. *Gravitational energy* is the earth's pull. *Chemical energy* refers to such things as the carbohydrates found in food or the methane in natural gas. All fuels have chemical energy in them. *Thermal energy* involves heat. All objects have thermal energy when they are hot. *Mechanical energy* is stored in the moving parts of machines. *Electrical energy* is found in charged objects. *Nuclear energy* comes from radioactive elements.

## Measuring Energy

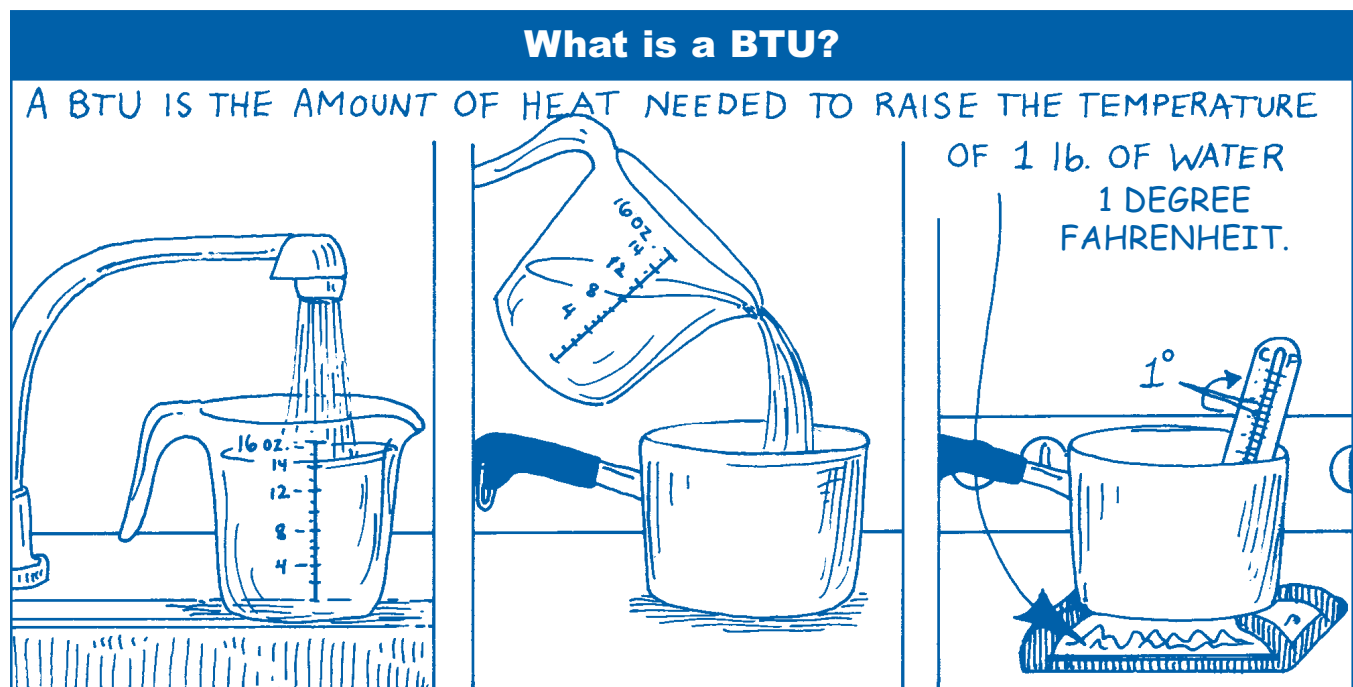
To measure energy, we determine the amount of heat energy being produced. This is done by using a measure known as a British thermal unit or Btu. The scientific definition of a Btu, as illustrated in the diagram below, is the amount

of heat needed to raise the temperature of one pound of water one degree Fahrenheit. The U.S. Energy Information Administration (EIA) operationally defines this as the amount of heat given off by one blue-tip kitchen match.

Btus become very helpful when trying to compare one fuel source with another. This is because energy comes in a variety of forms. Each form is measured in terms convenient to that state. For example, we measure natural gas in terms of its volume. Oil, which is a liquid, is measured in terms of barrels filled. Solid lumps of coal are weighed in tons. To be able to compare these different types of fuels, we need a common measure. This is where the Btu comes in. It allows us to compare energy in a variety of fuels that are measured differently.

## Energy Use

In looking at energy use, it's also helpful to think of how it is used. Energy analysts commonly think about energy use in terms of groups or *sectors* of the economy. As shown in the illustrations on the following page, these four sectors are the residential, commercial, industrial and transportation sectors.



The *residential sector* refers to private home usage of energy. “Homes” include single and attached family houses and townhouses, apartments, co-ops and condominiums, farmhouses and mobile homes. In this sector, people use energy for heating and cooling homes, running appliances, and heating swimming pools.

Schools, hospitals, hotels and motels, retail stores, movie complexes and theaters, and offices make up the *commercial sector*. Here, people use energy for heating and cooling, as well as running business equipment such as computers, cash registers and the like.

Manufacturers, miners, farmers, foresters and fisherman together form the *industrial sector*. Their energy needs are usually large, but can be quite small. They center on operating the machinery that runs our nation’s factories and mills.

The *transportation sector* includes the cars, trucks, buses and motorcycles that run on our nation’s highways. This sector also includes ships, trains, airplanes and helicopters. The energy needs for this sector are almost entirely for operating fuel.

## Conclusion

Being familiar with these basic concepts and terms will enhance your understanding of energy. Whether you use “The Energy Factbook” as a reference tool or for reading pleasure, it is yours to learn from and enjoy.

